7985 waterfowl

GLEN C. SANDERSON

JOB COMPLETION REPORT

WATERFOWL INVESTIGATIONS

State of Nebraska

Project No. 15-R Job No. 11

Title of Job: Waterfowl Kill Survey

Objectives: The determination of the size, species composition, and geographic and time distribution of the waterfowl harvest in Nebraska.

Procedure: A statewide post-season hunter survey using a uniform postcard questionnaire adopted by the states of the Central Flyway was initiated in 1954. It had been calculated that returns from 1800 waterfowl hunters were necessary to give the desired reliability, i.e., to pick up changes in excess of 10 percent. It was assumed that a 75 percent return would result from two mail contacts of the sample hunters. Therefore, it was necessary to mail questionnaires to 2400 waterfowl hunters.

As no record of the waterfowl hunters as such is available in Nebraska, it was necessary to select the mailing list at random from the 1953 Resident Hunt and Resident Hunt and Fish license stubs. As not all hunting license buyers are waterfowl hunters, it was necessary to further increase the sample by a factor, the ratio of hunting license sales to duck stamp sales, to assure returns from 1800 waterfowl hunters.

A numbered questionnaire card, self addressed and postage paid by addressee, and a post-season contact message were mailed to each correspondingly numbered name on the mailing list immediately following the waterfowl hunting season. Another card and a follow-up message were mailed to each hunter not answering the first mailing within three weeks. The survey closed at the end of the second three weeks.

Findings: A total of 3,232 questionnaires was returned by the 6,105 hunters on the mailing list. This represents a 52.9 percent return from the two mailings or considerably less than the assumed 75 percent return.

Two reasons probably account for this low return. First, questionnaire cards printed for use during the 1953 season were used for this survey. As the 1953 and 1954 hunting season dates did not correspond, confusion resulted from the questions concerning the kill by ten day periods. Secondly, the first mailing was delayed approximately three weeks after the waterfowl hunting season which allowed hunters to lose interest in the season results.

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Of those returning the questionnaire, 1,065 or 32.9 percent indicated that they hunted waterfowl one or more times. All calculations regarding mean kills, species composition, and geographic and periodic distribution of the kill are based on the answers of

JOB COMPLETION REPORT - F3

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Findings: A total of 4,232 questionnaires was returned by the 4,105 hunters on the mailing list. This represents a 52.3 percent return from the two mailings or considerably less than the anticipated 75 percent return.

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Of those returning the questionnaire, 1,355 or 32.9 percent indicated that they hunted waterfowl one or more times. All questionnaires regarding hunting kills, species composition, and geographic and portrait distribution of the kill are based on the answers of

this group. Assuming that this same percentage of all hunting license buyers in Nebraska hunted waterfowl, would indicate a statewide total of 52,857 waterfowl hunters.

This figure compares favorably with the Nebraska duck stamp sales for 1954 of 59,455. Previous studies show that 12-15 percent of the duck stamps are sold to persons who do not hunt but purchase them as collectors, contributors to the refuge program or as intending to hunt but being unable due to circumstances.

Table 1 presents a summary of the data obtained from the survey questionnaires. All figures presented in this table are projected estimates based on the survey answers corrected for hunter bias. Data from the survey and the calculations of totals appear in the appendix.

Figure 1 is a map of the areas used in a breakdown of the survey data. Figures 2, 3, and 4 show comparisons of hunter success by areas based on uncorrected data as reported.

Summary:

1. 3,232 questionnaires were returned by 6,105 hunters contacted giving a return rate of 52.9 percent.

2. Of the 3,232 returns, 1,065 or 32.9 percent indicated that they hunted waterfowl.

3. This percentage of the 1954 Nebraska hunting license buyers indicates a total of 52,857 waterfowl hunters.

4. The 1954 average kill for hunters in the sample was 6.526 ducks and .247 geese.

5. These averages indicate a statewide total kill of 344,945 ducks and 13,058 geese.

6. Mallards comprised 53 percent of the total duck bag followed by green-winged teal, 13.7 percent and blue-winged teal, 10.4 percent.

7. Blue and snow geese made up 41.3 percent of the total goose bag followed by canada-type geese, 32.1 percent and white-fronted geese, 14.3 percent.

8. As the questionnaire dates did not correspond to the actual season dates, the kill reported by ten day periods cannot be plotted accurately. However, indications are that the kill for the first and last ten days was nearly equal and together, amounted to more than one-half the total duck bag.

Prepared by Harvey W. Miller
Waterfowl Biologist

Approved by Lloyd P. Vance, Supervisor
Game Management Division

Date: December 1, 1955

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TABLE I, SUMMARY CENTRAL FLYWAY WATERFOWL KILL SURVEY -- NEBRASKA

A. No. of questionnaires sent in 1st mailing 6,105
B. No. of questionnaires returned from: 1st contact 1,983 ; follow up 1,249
C. No. of returns usable for compilations (same as number of hunters in the sample)* 1,065
D. Return information -

1. Number of days during the past season the hunters in the sample hunted waterfowl 11,073

2. In what five counties were waterfowl hunted most Scotts Bluff, Dodge, Dawson, Hall and Merrick.

3. Total number of waterfowl bagged: Ducks 344,945 Geese 13,058

4. Number of each kind of Geese bagged: Canada 4,192 Others 7,260 Unknown 1,606

5. Number of each kind of Ducks bagged:

a.	Mallard (green head)	182,821	g.	Canvasback	3,105
b.	Pintail (sprig)	21,732	h.	Redhead	3,794
c.	Green-wing Teal	47,258	i.	Scaup (bluebill)	6,209
d.	Baldpate (widgeon)	2,760	j.	Blue-wing Teal	35,874
e.	Gadwall	2,760	k.	Other kinds	690 -1
f.	Shoveller	6,554	l.	Unknown	31,388

6. Write number of DUCKS bagged within each of the following periods: -2

1st 10 days	79,682	4th 10 days	60,710
2nd 10 days	49,672	5th 10 days	75,543
3rd 10 days	46,568	6th 10 days	32,770

*Figure will be used to calculate averages.
-1 Includes calculated kill not listed by species on questionnaire.
-2 Questionnaire cards printed for 1953 were used for this survey. The 1954 hunting season opened 8 days earlier; therefore, the 10 day period dates did not correspond. The figures given here are relative only as there appeared to be no consistency in reporting either by dates or by 10 day period.

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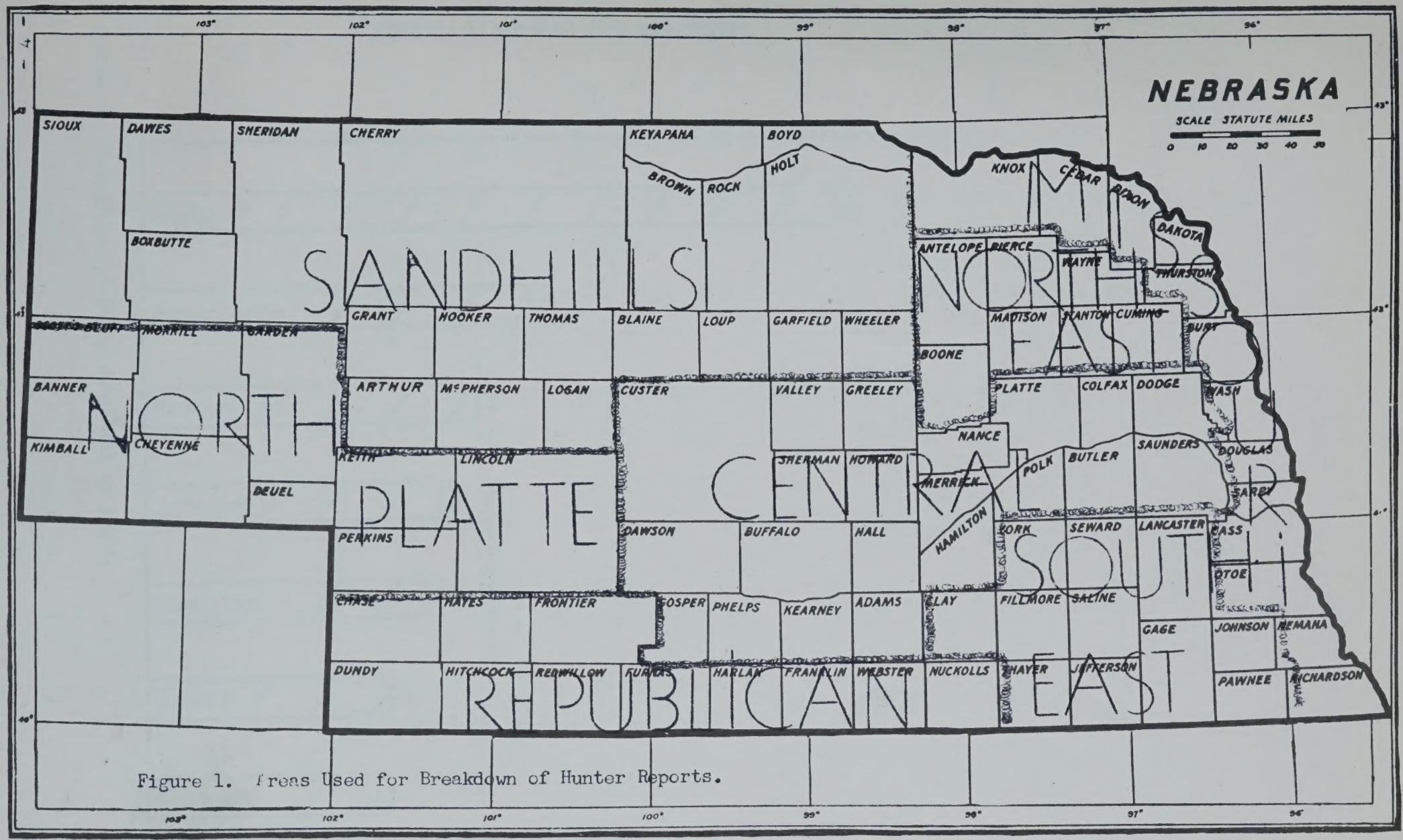

Figure 1. Areas Used for Breakdown of Hunter Reports.

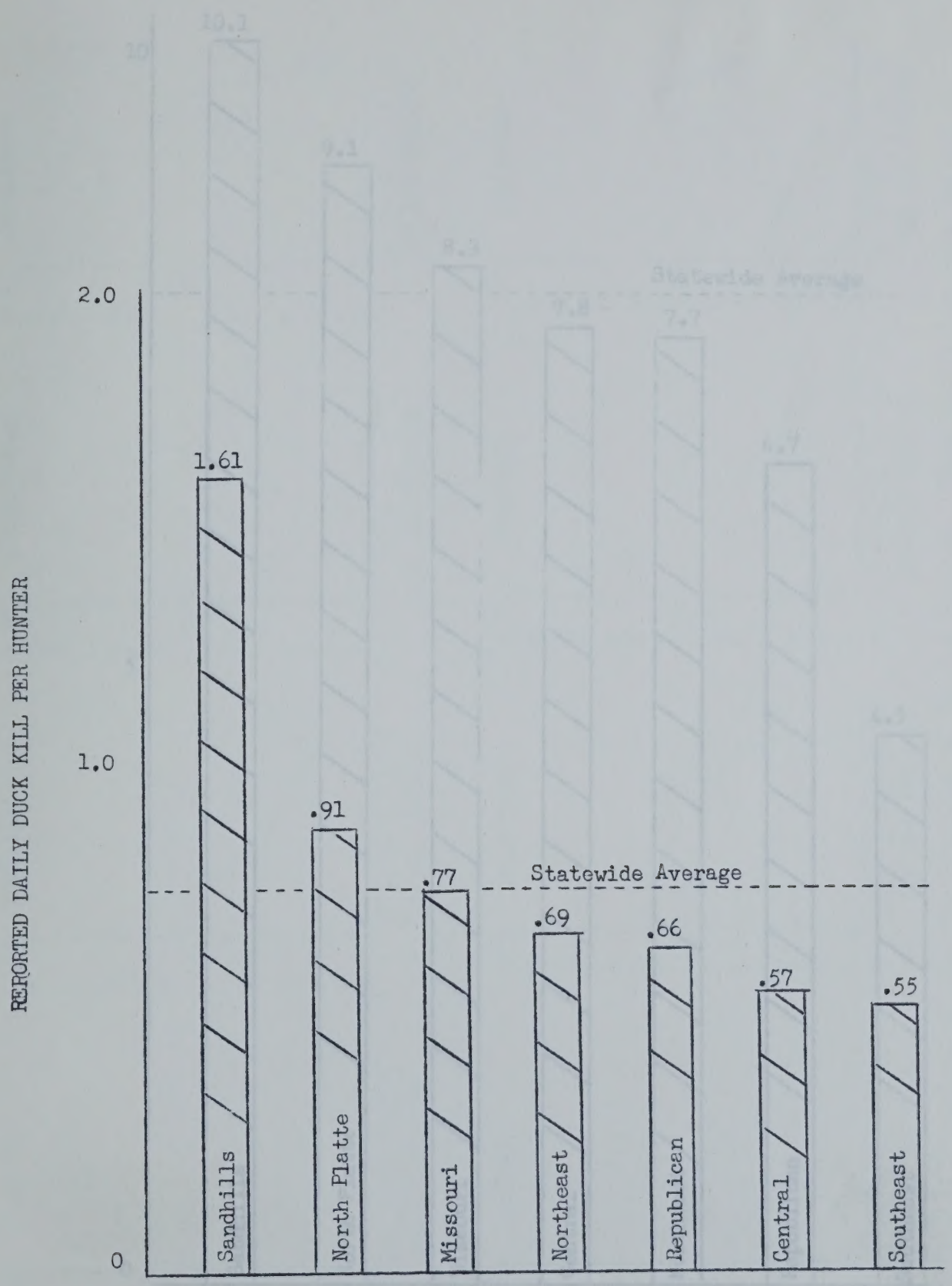

Figure 2. Comparison of Daily Duck Kill by Areas.

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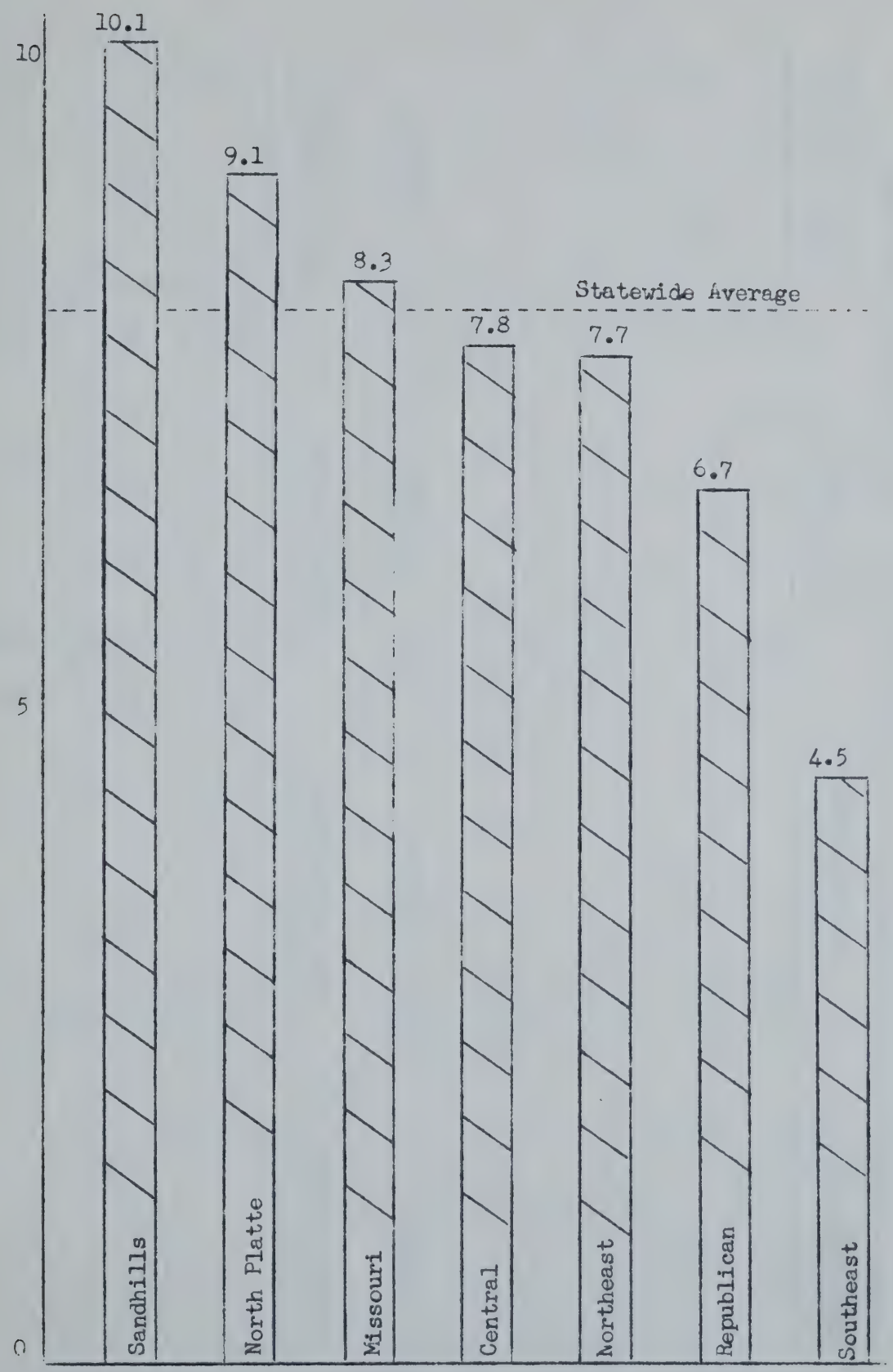
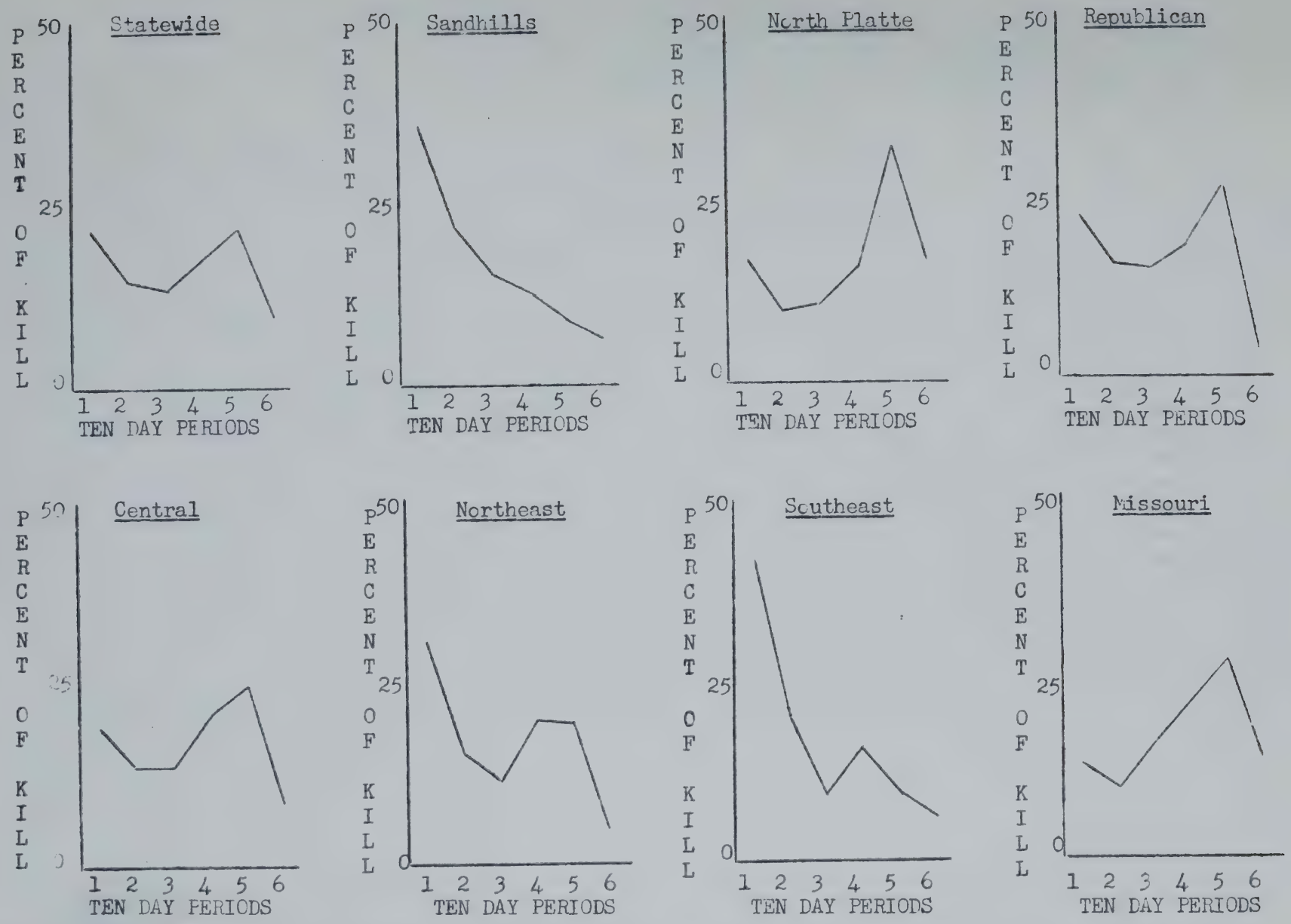


Figure 3. Comparison of Seasonal Duck Kill by Areas.



Fi ure 4. Graphic Comparison of Kill for Each Area by Ten Day Periods. (Figures relative only subject to discrepancy of dates on questionnaire.)

A P P E N D I X

Bag Size Averages to Determine Correction Curve - Ducks

	bag. size	freq. -1	bag. size	freq.	bag. size	freq.	bag. size	freq.	bag. size	freq.	bag. size	freq.	bag. size	freq.
	1	83	3	68	4	63	6	49	8	35	11	17	16	16
	2	90					7	35	9	36	12	37	17	8
											14	16	18	8
													19	7
totals	3	173	3	68	4	63	13	84	17	71	37	70	70	39
no. cases	2		1		1		2		2		3		4	
averages	1.5	86.5	3	68	4	63	668.5	42	8.5	35.5	12.33	23.33	17.5	9.75

-1 frequency - - number of time hunters reported each bag size.

Bag Size Averages to Determine Correction Curve - Ducks (continued)

	bag. size	freq.	bag. size	freq.	bag. size	freq.	bag. size	freq.	bag. size	freq.	bag. size	freq.	bag. size	freq.
	21	8	26	9	31	2	36	1	46	2	56	0	71	0
	22	4	27	3	32	3	37	1	47	0	57	0	72	0
	23	6	28	1	33	2	38	1	48	1	58	0	73	0
	24	5	29	1	34	3	39	0	49	1	59	1	74	0
							41	1	51	0	61	0	76	0
							42	3	52	0	62	0	77	0
							43	0	53	1	63	0	78	1
							44	1	54	1	64	0	79	0
											66	0	81	0
											67	1	82	0
											68	0	83	0
											69	0	84	0
													86	0
													87	1
													88	0
													89	0
totals	90	23	110	14	130	10	320	8	400	6	750	2	1280	2
no. cases	4		4		4		8		8		12		16	
averages	22.5	5.75	27.5	3.5	32.5	2.5	40	1	50	.75	62.5	.17	80	.12

Type II Memory Bias Correction Factors - Ducks

bag size	number of hunters from cards	number of hunters from curve (f)*	deviation from mean (d')	fd'	$f(d')^2$
0	222	306.09	- 6	-1836.54	11019.84
1	83	92.00	- 5	- 460.00	2300.00
2	90	80.00	- 4	- 320.00	1280.00
3	68	70.00	- 3	- 210.00	630.00
4	63	61.00	- 2	- 122.00	244.00
5	68	53.00	- 1	- 53.00	53.00
6	49	46.00	0		
7	35	41.00	1	41.00	41.00
8	35	36.00	2	72.00	144.00
9	36	31.50	3	94.50	283.50
10	49	27.50	4	110.00	440.00
11	17	24.50	5	112.50	612.50
12	37	21.50	6	129.00	774.00
13	10	19.00	7	133.00	931.00
14	16	17.00	8	136.00	1088.00
15	29	15.00	9	135.00	1215.00
16	16	13.25	10	132.50	1325.00
17	8	11.75	11	129.25	1421.75
18	8	10.50	12	126.00	1512.00
19	7	9.40	13	122.20	1588.60
20	10	8.30	14	116.20	1626.80
21	8	7.50	15	112.50	1687.50
22	4	6.70	16	107.20	1715.20
23	6	6.00	17	102.00	1734.00
24	5	5.40	18	97.20	1749.60
25	15	4.80	19	91.20	1732.80
26	9	4.30	20	86.00	1720.00
27	3	3.80	21	79.80	1675.80
28	1	3.45	22	75.90	1669.80
29	1	3.15	23	72.45	1666.35
30	10	2.80	24	67.20	1612.80
31	2	2.55	25	63.75	1593.75
32	3	2.30	26	59.80	1554.80
33	2	2.05	27	55.35	1494.45
34	3	1.85	28	51.80	1450.40
35	9	1.70	29	49.30	1429.70
36	1	1.55	30	46.50	1395.00
37	1	1.40	31	43.40	1345.40
38	1	1.30	32	41.60	1331.20
39					
40	4	1.08	34	36.72	1248.48
41	1	.98	35	34.30	1200.50
42	3	.90	36	32.40	1166.40
43					
44	1	.78	38	29.64	1126.32
45	3	.71	39	27.69	1079.91

(continued on next page)

Type II Memory Bias Correction Factors - Ducks (continued)

Bag size	number of hunters from cards	number of hunters from curve (f)*	deviation from mean (d')	fd'	$f(d')^2$
46	2	.66	40	26.40	1056.00
48	1	.57	42	23.94	1055.48
49	1	.52	43	22.36	961.48
50	2	.48	44	21.12	929.28
53	1	.39	47	13.33	861.51
54	1	.37	48	17.76	852.48
59	1	.26	53	13.78	730.34
67	1	.16	61	9.76	595.36
75	1	.10	69	6.90	476.10
78	1	.09	72	6.48	466.56
87	1	.06	81	4.86	393.66
total	1065	1065.00		233.00	71238.40

* A true distribution of hunting success results in a right skewed curve. The figures shown here are taken from such a curve constructed by using the bag size averages shown in a preceeding table.

Calculation of mean duck kill:

S - standard deviation

C - class interval

Σ - sum of . . . (totals)

1. $$S = C \sqrt{\frac{\Sigma f (d')^2}{\Sigma f} - \left(\frac{\Sigma fd'}{\Sigma f}\right)^2}$$

$$= 1 \sqrt{\frac{71238.40}{1065} - \left(\frac{233}{1065}\right)^2}$$

$$= 1 \sqrt{66.8330 - (.2188)^2}$$

$$= 1 \sqrt{66.8330 - .4787}$$

$$= 1 \sqrt{66.3543}$$

$$8.1458$$

2. $$\bar{x} = \bar{z} + \frac{fd'}{f}$$

$$= 6 + .2188$$

$$= 6.2188$$

$\bar{x}$ - real mean

$\bar{z}$ - quessed mean

3. $\bar{x} + 6S$ = 94.69% of the series distribution

$6.2188 + 6(8.1458)$

$6.2188 + 48.8748 = 55.0936$ = reliable range of series

4. $$\bar{x} \text{ of } 0\text{-}55 = \bar{z} + \frac{\Sigma fd'}{\Sigma f} \text{ 0-55}$$

$$= 6 + \frac{191.22}{1064.33}$$

$$= 6 + .1798$$

5. $$\bar{x} \text{ for entire sample} = \frac{\text{mean of 0-55}}{\text{\% of series in 0-55}}$$

$$= \frac{6.1798}{.9469}$$

$$= \underline{\underline{6.526}}$$ = average duck kill of all hunters in sample corrected for all bias errors.

Bag Size Averages to Determine Correction Curve - Geese

	bag. size	freq. -1	bag. size	freq.	bag. size	freq.	bag. size	freq.	bag. size	freq.	bag. size	freq.
	1	62	2	31	3	13	4	10	7	4	11	0
							6	1	8	0	12	1
									9	0	14	1
totals	1	62	2	31	3	13	10	11	24	4	37	2
No. cases	1		1		1		2		3		3	
averages	1	62	2	31	3	13	5	5.5	8	1.33	12.33	.67

-1 frequency - - number of times hunters reported each bag size.

Type II Memory Bias Correction Factors -- Geese

bag size	number of hunters from cards	number of hunters from curve (f)	deviation from mean (d')	fd'	$f(d')^2$
0	935	936.60	- 1	- 936.60	936.60
1	62	62.00	0	0.00	0.00
2	31	31.00	1	31.00	31.00
3	13	13.00	2	26.00	52.00
4	10	10.40	3	31.20	93.60
5	6	5.50	4	22.00	88.00
6	1	2.70	5	13.50	67.50
7	4	1.60	6	9.60	57.60
8					
9					
10					
11					
12	1	.70	11	7.70	84.70
13					
14	1	.50	13	6.50	84.50
15					
TOTALS	1064	1064.00		- 789.10	1495.50

Calculation of mean goose kill:

1. $$S = C \sqrt{\frac{\Sigma f(d')^2}{\Sigma f} - \left(\frac{\Sigma fd'}{\Sigma f}\right)^2}$$

S - standard deviation
C - class interval
Σ - sum of (from table)

$$S = 1 \sqrt{\frac{1495.50}{1064} - \left(\frac{-789.10}{1064}\right)^2}$$

$$S = 1 \sqrt{1.406 - (-.742)^2}$$

$$S = 1 \sqrt{.855}$$

$$S = \underline{.9246}$$

2. $$\bar{x} = \bar{z} + \frac{\Sigma fd'}{\Sigma f} C$$

$$\bar{x} = 1 + \frac{-789.10}{1064} 1$$

$\bar{x}$ - correct mean
$\bar{z}$ - guessed mean

$$\bar{x} = 1 + (-.742)$$

$$\bar{x} = \underline{.258}$$

3. $\bar{x} + 6S = 94.69\%$ of the series distribution

$x + 6(.9246)$

$.258 + 5.5476 = 5.8056 = 94.69\%$ of reliable bag classes.

therefore 0 - 6 are the limits of reliable bag classes.

4. $$x \text{ of } 0-6 = \bar{z} + \frac{\Sigma fd' \ (0-6)}{\Sigma f \ (0-6)}$$

$$= 1 + \frac{-812.90}{1061.20}$$

$$= 1 + (-.766)$$

$$= \underline{.234}$$

5. $$\frac{\bar{x} \ (0-6)}{\% \text{ series } (0-6)}$$ = corrected mean for entire sample

$$\frac{.234}{.9469} + \underline{\underline{.247}}$$

3 0112 115700186

Calculation of mean goose kill:

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$S = 1 \sqrt{\frac{2429.72}{1064} - \left(\frac{-789.10}{1064}\right)^2}$

$S = 1 \sqrt{1.406 - (-.742)^2}$

$S = 1 \sqrt{.855}$

$S = \underline{.9246}$

$\bar{x} =$

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3. $\bar{x} + \sigma S = 94.69\%$ of the series distribution

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$= 1 + \frac{-812.90}{1061.30}$

$= 1 + (-.766)$

$= \underline{.234}$

5. $\frac{\bar{x} \quad (0-6)}{\Sigma \text{ series } (0-6)}$ = corrected mean for entire sample

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